

CLAIMS:

1. A composition comprising at least one carboxyl-containing polyester and at least one β -hydroxyalkylamide, wherein the polyester comprises condensed units of

- A) at least one of an aliphatic diol, cycloaliphatic diol or polyol,
- B) at least one of an aliphatic carboxylic acid, cycloaliphatic carboxylic acid, aromatic dicarboxylic acid or polycarboxylic acid,
- C) at least one of an aliphatic carboxylic ester, cycloaliphatic carboxylic ester, aromatic dicarboxylic ester or polycarboxylic ester.

wherein the polyester has a glass transition temperature of from 30 to 90°C and an acid number of from 10 to 150 mg KOH/g.

2. The composition of Claim 1, wherein A) is at least one selected from the group consisting of monoethylene glycol, 1,2-propylene glycol, 1,3-propylene glycol, 1,4-butylene glycol, 2,3-butylene glycol, di- β -hydroxyethylbutanediol, 1,5-pentanediol, 1,6-hexanediol, 1,8-octanediol, decanediol, dodecanediol, neopentyl glycol, cyclohexanediol, 3(4),8(9)-bis(hydroxymethyl)tricyclo[5.2.1.0^{2,6}]decane (Dicidol), 1,4-bis(hydroxymethyl)-cyclohexane, 2,2-bis(4-hydroxycyclohexyl)propane, 2,2-bis[4-(β -hydroxyethoxy)phenyl]-propane, 2-methylpropane-1,3-diol, 2-methylpentane-1,5-diol, 2,2,4(2,4,4)-trimethylhexane-1,6-diol, glycerol, trimethylolpropane, trimethylolethane, hexane-1,2,6-triol, butane-1,2,4-triol, tris(β -hydroxyethyl) isocyanurate, pentaerythritol, mannitol, sorbitol, diethylene glycol, triethylene glycol, tetraethylene glycol, dipropylene glycol, a polypropylene glycol, a polybutylene glycol, xylylene glycol, and neopentyl glycol hydroxypivalate.

3. The composition of Claim 1, wherein B) is at least one selected from the group consisting of succinic acid, adipic acid, suberic acid, azelaic acid, sebacic acid, phthalic acid, terephthalic acid, isophthalic acid, trimellitic acid, pyromellitic acid, tetrahydrophthalic acid, hexahydrophthalic acid, hexahydroterephthalic acid, dichlorophthalic acid, tetrachlorophthalic acid, endomethylenetetrahydrophthalic acid, glutaric acid, and 1,4-cyclohexanedicarboxylic acid.

4. The composition of Claim 1, wherein B) is at least one selected from the group consisting of isophthalic acid, terephthalic acid, hexahydroterephthalic acid, hexahydrophthalic acid, adipic acid, and succinic acid.

5. The composition of Claim 1, wherein B) is at least one selected from the group consisting of isophthalic acid and terephthalic acid.

6. The composition of Claim 1, wherein C) is at least one selected from the group consisting of succinic ester, adipic ester, suberic ester, azelaic ester, sebacic ester, phthalic ester, terephthalic ester, isophthalic ester, trimellitic ester, pyromellitic ester, tetrahydrophthalic ester, hexahydrophthalic ester, hexahydroterephthalic ester, dichlorophthalic ester, tetrachlorophthalic ester, endomethylenetetrahydrophthalic ester, glutaric ester, and 1,4-cyclohexanedicarboxylic ester.

7. The composition of Claim 1, wherein C) is at least one selected from the group consisting of isophthalic acid ester, terephthalic acid ester, hexahydroterephthalic acid ester, hexahydrophthalic acid ester, adipic ester, and succinic ester.

8. The composition of Claim 1, wherein C) is at least one selected from the group consisting of isophthalic ester and terephthalic ester.

9. The composition of Claim 1, wherein A) is at least one selected from the group consisting of an aliphatic diol, a cycloaliphatic diol, and a polyol; B) is at least one selected from the group consisting of an aliphatic acid, a cycloaliphatic acid, an aromatic dicarboxylic acid and a polycarboxylic acid; and C) is at least one selected from the group consisting of an aliphatic ester, a cycloaliphatic ester, an aromatic dicarboxylic ester and a polycarboxylic ester.

10. The composition of Claim 1, wherein A) is at least one selected from the group consisting of an aliphatic diol, a cycloaliphatic diol and a polyol; B) is at least one selected from the group consisting of an aliphatic acid, an aromatic dicarboxylic acid and a polycarboxylic acid; and C) is at least one selected from the group consisting of an aliphatic ester, an aromatic dicarboxylic ester, and a polycarboxylic ester.

11. The composition of Claim 1, wherein A) is at least one selected from the group consisting of an aliphatic diol, a cycloaliphatic diol and a polyol; B) is at least one selected from the group consisting of an aromatic dicarboxylic acid and a polycarboxylic

acid; and C) is at least one selected from the group consisting of an aromatic dicarboxylic ester and a polycarboxylic ester.

12. The composition of Claim 1, wherein the β -hydroxyalkylamide is selected from the group consisting of N,N,N',N'-Tetrakis(2-hydroxyethyl)adipamide, N,N,N',N'-Tetrakis(2-hydroxypropyl)adipamide, and N,N-Bis(2-hydroxyethyl)-4-tert-butylphenylamide.

13. The composition of Claim 1, wherein the polyester is prepared by condensing the units at a temperature of from 100 to 260°C.

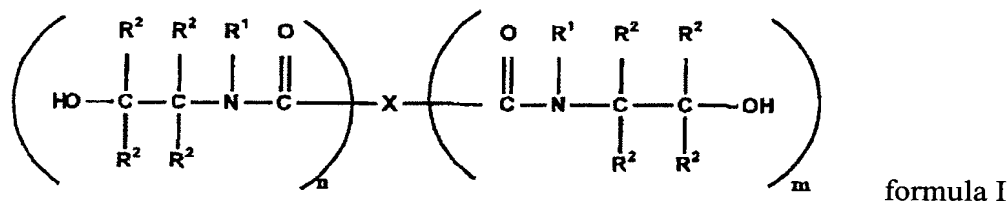
14. The composition of Claim 1, wherein the polyester is prepared by condensing the units at a temperature of from 130 to 220°C.

15. The composition of Claim 1, wherein the polyester is prepared by condensing the units in the melt or azeotropically.

16. The composition of Claim 1, further comprising one or more additives selected from the group consisting of a leveling agent, a devolatilizer, a filler, a dye, a catalyst, a light stabilizer, a heat stabilizer, an antioxidant, and an effect additive.

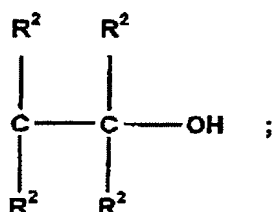
17. The composition of Claim 1, wherein the ratio of the polyester and the β -hydroxyalkylamide is from 0.4:1 to 2.0:1, based on the ratio of carboxyl groups of the polyester to hydroxyl groups of the hydroxyalkylamide.

18. The composition of Claim 1, wherein the β -hydroxyalkylamide is of formula I



wherein

- X is a chemical bond, hydrogen or a monovalent or polyvalent organic group derived from saturated, unsaturated or aromatic hydrocarbon groups, having 1-24 carbon atoms, that may be heteroatom substituted;
- R¹ is hydrogen or an alkyl, alkenyl, aryl or aralkyl radical having 1-24 carbon atoms, that may be heteroatom substituted, or



wherein

- R² is, independently, one or more, identical or different radicals selected from hydrogen, an alkyl, aryl, aralkyl or alkenyl radical having 1-24 carbon atoms, that may be heteroatom substituted;
- n is an integer 1-10;
- m is an integer 0-2; and
- n + m is ≥ 1 .

19. In a powder coating composition, wherein the improvement comprises, the presence of a composition comprising at least one carboxyl-containing polyester and at least one β -hydroxyalkylamide, wherein the polyester comprises condensed units of

- A) at least one of an aliphatic diol, cycloaliphatic diol or polyol,
- B) at least one of an aliphatic carboxylic acid, cycloaliphatic carboxylic acid, aromatic dicarboxylic acid or polycarboxylic acid,
- C) at least one of an aliphatic carboxylic ester; cycloaliphatic carboxylic ester, aromatic dicarboxylic ester or polycarboxylic ester.

wherein the polyester has a glass transition temperature of from 30 to 90°C and an acid number of from 10 to 150 mg KOH/g.

20. A method for preparing the composition of Claim 1, comprising mixing the polyester with the β -hydroxyalkylamide.

21. The method of Claim 20, further comprising
mixing at least one of a filler or an additive with the polyester and the β -hydroxyalkylamide.
22. The method of Claim 20, wherein the polyester and the β -hydroxyalkylamide are mixed by extrusion.
23. The method of Claim 20, wherein the polyester and the β -hydroxyalkylamide are mixed at a temperature of $\leq 140^{\circ}\text{C}$.
24. A coating obtained by covering a substrate with the composition of Claim 1, and cross-linking the composition.
25. A process comprising
applying a powder comprising the composition of Claim 1, to a substrate to form a coated substrate, and
heating the coated substrate to a temperature of from 140 to 220°C .
26. The method of Claim 25, wherein the powder composition is applied by electrostatic power spraying, tribostatic power spraying, or fluid-bed sintering.
27. A coated substrate obtained by the process as claimed in Claim 25.